



Coherent Technologies, Inc.
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Bridging the gap between innovation and application, Coherent Technologies, Inc. (CTI) is a world leader in the development of laser based, remote sensing systems. Our technological advances are at the heart of products designed to meet the rigorous requirements of government, military, and commercial customers. CTI and its commercial products division, CLR Photonics, Inc. (CLR) is a full service company capable of generating new laser-based technology concepts from technology development & demonstration through product engineering to product manufacturing. CTI is committed to developing and maintaining the complete set of core competencies required by our customers for products and services that cover the spectrum from innovation to production.

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Development of a Solid-State Coherent-LIDAR for Naval Wind Sounding Applications



About the Technology

Coherent Technologies, Inc. has developed a pulsed coherent 2 limiting diode-pumped solid-state LIDAR receiver on an injection-seeded, Q-switched, 2 micron laser that has the capability of meeting Navy requirements for remote sensing, moderate range, high spatial resolution wind field measurements around Navy aircraft carriers. It is ideally suited for range-resolved and volumetric clear wind-field mapping and the measurement of aerosol concentration levels over municipal-sized areas. Light Detection and Ranging Systems (LIDARs) are similar to radar. They use pulsed laser light instead of radio waves to detect particles and varying conditions in the atmosphere. The 2 micron, coherent LIDAR is capable of pulse energies of 2 megajoule and a pulse frequency of 500 Hz, with pulse duration of 400 nanoseconds. Wind velocity accuracy is better than 0.6 knots and wind direction is better than 3 degrees for wind speeds (combination of ship speed and wind velocity) greater than 10 knots. The maximum wind measurement height is 6 km in clear air and 2 km in heavy rain (25 mm/hr) with vertical resolution better than 10 meters for the first 200 to 300 meters and approximately 60 meters for heights greater than 300 meters.

Benefits to PEO C4I&Space and other DOD Programs

The current way to measure wind speed and direction around a ship includes deck-level anemometers, which cannot provide volumetric accuracy and range. The ability of Coherent's solid-state LIDAR to have precise and accurate knowledge of the ambient flow field in the area of carrier operation and to provide clear air turbulence detection of favorable wind conditions above or below the flight path assists in ensuring safer flight operations during the critical phase of takeoffs and landings. Smaller vessels can also benefit from LIDAR wind data for helicopter landings and other wind impacted activities, making such extremely difficult and dangerous events safer and more precise.

Why Coherent's Solid-State LIDAR Improves Wind Detection

- Provides an eye safe infrared laser transceiver
- Field deployable with unmanned round-the-clock operation capability
- Provides broad, volumetric area of accurate wind and aerosol data.
- Provides accurate wind shear detection and measurement of terrain-induced wind shear and turbulence

Military and Commercial Significance

- Coherent has developed WindTracer®, a commercial version of the solid-state LIDAR developed under the SPAWAR SBIR Program.
- WindTracer® has passed the 10,000 hour threshold with its first year of operations at Hong Kong International Airport.
- WindTracer® has been installed at St Louis International Airport for wake vortex studies by the FAA and NASA.
- The Army Research Laboratory procured WindTracer® in June 2002 using it for various urban test scenarios.
- WindTracer® has been purchased by the Army's Dugway Proving Grounds and is used at DOD test ranges as the truth for chemical biological testing.
- WindTracer® is also being used by Arizona State University and Forschungszentrum Karlsruhe Deutsches Zentrum Fuler Luft.
- Coherent's laser technology is also used as the transmitter subsystem for a major aerospace prime contractor for EOSS+, a consolidated, integrated electro-optic automatic test system.

